the electrodes (20; 20'),

characterized in that

at least a part (25A) of the carrier (25; 25') is arranged in a plane transverse to the longitudinal axis (12; 12'),

the auxiliary amalgam extends substantially in two orthogonal directions transverse to said longitudinal axis, and is disposed substantially in line with said at least one of the electrodes in a direction parallel with said longitudinal axis,

the carrier is provided on a supporting body formed by an exhaust tube (26) which extends at least partially into the discharge space (18) and has an end portion which is situated in the discharge space, and

the carrier (25; 25') is press-fitted onto the end portion of the exhaust tube (26).

REMARKS

With respect to "Disposition of Claims" item 6 on page 1, Office Action Summary, applicants point out that claims 3 and 4 were cancelled by the amendment filed November 11, 2002.

Claim 15 is requested to be amended to provide a proper antecedent basis for the phrase "supporting body."

Amendment of claims 1 and 15 is also requested to include expressly the limitation which was inherent in the claims previously, and appears to be overlooked in the Paper No. 11 rejection: an auxiliary amalgam is in addition to the source of the rest of the mercury.

Applicants appreciate the indication of allowable subject matter in claims 16-18, and request amendment of claim 16 to place it in independent form.

Art rejections - US 6,043,603 (Weinhardt)

Auxiliary amalgam

Applicants request reconsideration of the rejection of claims 1, 2, 5, 7, 8, 10 and 12 as anticipated by Weinhardt because nothing in Weinhardt teaches nor suggests an auxiliary amalgam, much less one located as claimed herein.

As one of ordinary skill in the art would understand claim 1 as originally filed, the lamp

must comprise both a filling of mercury and an auxiliary amalgam which is separate from the filling of mercury. The filling of mercury may be provided, for example, by one or more drops of mercury or a main amalgam. Furthermore, the ordinary meaning of the word "auxiliary" makes clear that this is not the primary source of mercury.

The instant specification makes it clear that the lamp claimed herein has a filling of mercury, and an auxiliary amalgam. For example, lines 3-5 on page 2 refer to "a main amalgam and an auxiliary amalgam." Those of ordinary skill know that, in order to be "an auxiliary amalgam" the auxiliary amalgam is not the source of the "filling of mercury" but instead is an additional element, disposed to reduce the run-up time. As described at lines 27-34 of page 2 of the specification as filed, when the lamp is started, "more mercury is loosened relatively more rapidly from the auxiliary amalgam."

Weinhardt disclosure

Weinhardt teaches that a lamp has a supporting element (12, 22, 32, 42, 52) provided with a source of mercury (13, 23, 33, 43, 53) on one side and a getter material (14, 24, 34, 44, 54) on another side. The mercury source is a coating of amalgam such as a mercury-titanium alloy (col. 4, lines 3-4;). During manufacture this coating is heated, for example to 900° to 950° C (col. 1, lines 60-63), fully to release the mercury in the coating (col. 2, lines 63-67). The full release is also taught by col. 4, lines 6-9. The effective production of high temperature in the support plate to achieve full release of the mercury during the induction heating is a feature of the Weinhardt invention.

As a result, after manufacture of the lamp, the mercury-titanium alloy will have been converted into substantially pure titanium, and will not function as a main amalgam. There can be no other explanation for the emphasis on full release during the RF heating. On the other hand, the temperature-compensating function of a mercury-containing amalgam during steady-state operation is well known, and is emphasized by US 3,562,571 to Evans (further discussed below).

The first, second and fourth embodiments, in which the amalgam coating is perpendicular to the lamp axis, mount the support plate on one of the current supply conductors. The third and fifth embodiments mount the support plate from the exhaust tube, but teach that the portions of the plate on which the coatings exist are inclined 30° to 60° from the lamp axis.

Nothing in Weinhardt suggests that the supporting element (12 ...) and mercury source (13 ...) have any subsequent function during post-manufacture use of the lamp.

Patentability of claim 1

It has been shown above that the structure disclosed in Weinhardt does not anticipate claim 1, because the coatings 13, 23, and 43 are one-time mercury sources.

Further, there is no accidental teaching of a structure which will inherently perform the function of an auxiliary amalgam. Those of ordinary skill will recognize that an amalgam whose mercury content is fully released during manufacture will not function subsequently as an auxiliary amalgam. Further, no one of ordinary skill would expect that the amalgam coating taught by Weinhardt could be heated to a temperature sufficient to release mercury for rapid run-up, simply by radiation from the electrodes within the lamp. Thus, Weinhardt does not suggest the instant invention.

Claims 2, 5 and 8

As described above the only embodiments of Weinhardt, which do not support the carrier from a current source conductor, have the coatings at angles which are far removed from "transverse to said longitudinal axis." Thus this is an additional reason there is no anticipation.

Claims 10, 11

Applicants request reconsideration of the rejection of claims 9 and 11 as unpatentable over Weinhardt because one of ordinary skill in the art, upon reading the disclosure of Weinhardt in its entirety, would be led to provide a relatively large spacing between the lamp electrode and the part of the carrier which is perpendicular to the lamp axis. If the mercury-containing coating were spaced such a short distance as 0.5 mm (claim 10), or 3 mm (claim 11) fom the electrode, the heating to 900° C or greater during manufacture would be likely to cause undesirable transfer of material to the electrode, which is relatively cold at that time.

Further, it may be noted that the three embodiments which show the layer 13, 23, 43 perpendicular to the lamp axis have in common that the layer is closer to the foot 11d, 21d or the bead 41d than the layer spacing from the electrode.

Thus nothing in Weinhardt provides any incentive to reduce the layer-to-electrode spacing.

Art rejection - Weinhardt and US 3,562,571 (hereinafter "Evans")

Applicants request reconsideration of the rejection of claim 6 over Weinhardt in view of Evans because press fitting the Weinhardt carrier onto the stem would make it difficult or impossible to achieve the high RF heating temperature necessary to release the mercury. Further, if a press-fitted carrier were heated to such a high temperature after press fitting, the grip force of the press fit would be so reduced that the one of ordinary skill would fear that the the carrier would loosen its grip on the stem

Like Busch, applied previously, Evans teaches a fluorescent lamp having a main amalgam 28 and an auxiliary amalgam 30. The Evans main amalgam is retained by a generally cylindrical collar 27 which is placed around the stem 14, and is concentric with the longitudinal axis of the lamp. This main amalgam stabilizes the mercury pressure over a wide range of ambient temperatures, and is never heated to an extreme temperature because it may vaporize and migrate to the envelope wall (col. 1, lines 73-74).

The Evans auxiliary amalgam is "carried by a wire mesh holder 32 which is fastened to one of the lead wires and extends to the press seal 18 of the associated stem 14" (col. 4, lines 1-3).

As described at lines 34-42 of col. 4, the auxiliary amalgam 30 is preferably a narrow strip that is pressed into the planar surface of the holder 32. Two legs of the holder 32 extend along and grip the sides of the stem 14, with the amalgam entirely to one side of the stem. Alternatively as shown in Fig. 4, a blob of amalgam 38 is on a piece of sheet metal 34 extending to one side of the stem 14a.

Thus the Evans teaching is that an auxiliary amalgam, however shaped, is placed to one side of the stem, and in fact has a tongue T between much of the amalgam and the electrode. As a result the effective distance of the auxiliary amalgam from the electrode is relatively large, and is not arranged for fastest heating.

Accordingly, no proper combination of Weinhardt and Evans suggests the instant invention.

Art rejection - Weinhardt in view of US 3,688,148 (hereinafter "Fedorenko")

Applicants request reconsideration of the rejection of claim 15 over Weinhardt in view of Fedorenko because one of ordinary skill would consider that Fedorenko teaches away from making the claimed combination. Like claim 1, claim 15 requires that the carrier be at least partially transverse to the tube axis, and that the amalgam extend substantially in two orthogonal directions transverse to that axis. These limitations are inconsistent with Fedorenko.

Further, a proper combination of these patents cannot suggest claim 15 because neither patent discloses or suggests an auxiliary amalgam.

Fedorenko disclosure

Fedorenko teaches the desirability of a fluorescent lamp with a single amalgam whose position within the lamp can be varied, according to the ambient temperature range for which the lamp is intended. One of these embodiments uses the exhaust tube 4 as a double-ended container for the amalgam 12.

The embodiment of Fedorenko Fig. 1 teaches that the ball of auxiliary amalgam 12 is contained within a hollow exhaust tube, in a chamber which has an axial portion extending between two spherically expanded portions. The chamber is closed at the each end and has a small opening 11 through which the chamber communicates with the discharge space. One of ordinary skill will understand from Fig. 1 that an exhaust tubulation at the outer end is pinched off after loading with amalgam, evacuation and back-filling with low pressure inert gas. In this embodiment the ball of amalgam can be moved by the user into either expanded portion by tilting the lamp prior to installation into the luminaire, so that the amalgam is thermally exposed primarily to (1) the high temperature zone of the lamp adjacent the electrode for use in normal or cool environments, or (2) the region adjacent the end cap for use in high temperature environments.

One of ordinary skill in the art would say that the exhaust tube is that portion of element 4 which extends from the piched-off tip near the metal end cap to the aperture 11. The hollow portion extending from aperture 11 toward the electrode 6 is an extension of the tube which has nothing to do with exhaust, but is molded or pressed there solely to provide an alternative housing for the amalgam.

The Figs. 2 and 3 embodiment has an elongated tubular carrier 17 formed by a tube 18 within which a ball or cylinder of amalgam 12 is captured by one or two tubular spacers 19 and

inward bent lips (not numbered) at each end. The tubular carrier is inserted into the exhaust tube 14 with the amalgam selectively at the inner or outer end or the middle, and captured by a bracket/petal 16 before the exhaust tube and electrode assembly assembly are sealed to the tubular portion of the envelope.

Patentability of claim 15

Like Weinhardt, Fedorenko has only a single amalgam, and there is no other source of mercury, so nothing in Fedorenko at all suggests an auxiliary amalgam. The amalgam location has nothing to do with rapid run-up resulting from proximity to the electrode, but rather is concerned with steady-state temperature balance. Thus in this respect the combination teaches away from the instant invention even more than Weinhardt by itself.

Neither of the Fedorenko embodiments suggests a carrier on which an auxiliary amalgam is provided, because the Fedorenko teaches carriers in which an amalgam is contained, so that combining Fedorenko with Weinhardt should require that the resulting carrier be a container in which the sole mercury source is contained.

Neither of the Fedorenko embodiments are usable with a carrier which at least in part is arranged in a plane transverse to the longitudinal axis. Neither of the Fedorenko embodiments can be used with an amalgam which extends substantially in two orthogonal directions transverse to that axis.

The Fedorenko Fig. 1 exhaust tube is not and does not suggest a support for an amalgam carrier, but rather the "substantially spherically expanded hollow portions 10" (col. 4, lines 14, 15) are alternative containers for the amalgam, which must be somewhat spherical in shape. There is no suggestion of using the exhaust tube to support an amalgam carrier where the carrier is arranged in a plane transverse to the tube longitudinal axis amalgam. To do so would require a great change in the shape of the exhaust tube, and, without the benefit of the teachings of the instant application, there is no apparent reason to make those changes. In particular, by making the required changes the whole advantage of Fedorenko, by which the amalgam location is readily changed, would be lost; and the exhaust tube configuration would be changed from a Fedorenko-type to a conventional exhaust tube.

The embodiments of Fedorenko Figs. 2 and 3 also teach away from the claimed

combination. The amalgam 12 is within a container 17 having an inner tube for locating the amalgam. Each of the container 17 and inner tube are quite elongated in the direction of the fluorescent tube longitudinal axis. This strongly militates against any suggestion of modifying the structure to support a carrier which extends transverse to the longitudinal axis, and which carries an auxiliary amalgam which extends substantially in two orthogonal directions transverse to the longitudinal axis.

Accordingly, one of ordinary skill in the art would not find in any combination of Fedorenko and Weinhardt a reason to provide an auxiliary amalgam on a carrier as defined in claim 15.

CONCLUSION

All formal matters have been corrected, and the claims shown to be patentable. Early favorable action on the merits of the application is respectfully requested.

Respectfully submitted,

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MARKED-UP CLAIMS

1.(twice amended) A low-pressure mercury vapor discharge lamp comprising a discharge vessel (10), said discharge vessel (10) enclosing a discharge space (18) containing a filling of mercury and an inert gas in a gastight manner, and said discharge vessel (10) comprising:

tubular end portions (11; 11'), which each have a longitudinal axis (12; 12'),

electrodes (20; 20') arranged in the discharge space (18) for generating and maintaining a discharge in the discharge space (18),

and, in addition to said filling of mercury and inert gas, at least an auxiliary amalgam (27) provided on a carrier (25; 25') in the discharge vessel (10) in the proximity of at least one of the electrodes (20; 20'),

characterized in that

at least a part (25A) of the carrier (25; 25') is arranged in a plane transverse to the longitudinal axis (12; 12'), and

the auxiliary amalgam extends substantially in two mutually orthogonal directions transverse to said longitudinal axis, and is disposed substantially in line with said at least one of the electrodes in a direction parallel with said longitudinal axis.

15.(amended) A low-pressure mercury vapor discharge lamp comprising a discharge vessel (10), said discharge vessel (10) enclosing a discharge space (18) containing a filling of mercury and an inert gas in a gastight manner, and said discharge vessel (10) comprising:

tubular end portions (11; 11'), which each have a longitudinal axis (12; 12'),

electrodes (20; 20') arranged in the discharge space (18) for generating and maintaining a discharge in the discharge space (18),

and, in addition to said filling of mercury and inert gas, at least an auxiliary amalgam (27) provided on a carrier (25; 25') in the discharge vessel (10) in the proximity of at least one of the electrodes (20; 20'),

characterized in that

at least a part (25A) of the carrier (25; 25') is arranged in a plane transverse to the longitudinal axis (12; 12'),

the auxiliary amalgam extends substantially in two orthogonal directions transverse to said longitudinal axis, and is disposed substantially in line with said at least one of the electrodes in a direction parallel with said longitudinal axis, and

the carrier is provided on a supporting body [is] formed by an exhaust tube (26) which extends at least partially into the discharge space (18).

16.(amended) A low-pressure mercury vapor discharge lamp [as claimed in claim 15, wherein] comprising a discharge vessel (10), said discharge vessel (10) enclosing a discharge space (18) containing a filling of mercury and an inert gas in a gastight manner, and said discharge vessel (10) comprising:

tubular end portions (11; 11'), which each have a longitudinal axis (12; 12'),

electrodes (20; 20') arranged in the discharge space (18) for generating and maintaining a discharge in the discharge space (18),

and, in addition to said filling of mercury and inert gas, at least an auxiliary amalgam (27) provided on a carrier (25; 25') in the discharge vessel (10) in the proximity of at least one of the electrodes (20; 20'),

characterized in that

at least a part (25A) of the carrier (25; 25') is arranged in a plane transverse to the longitudinal axis (12; 12'),

the auxiliary amalgam extends substantially in two orthogonal directions transverse to said longitudinal axis, and is disposed substantially in line with said at least one of the electrodes in a direction parallel with said longitudinal axis,

the carrier is provided on a supporting body formed by an exhaust tube (26) which extends at least partially into the discharge space (18) and has an end portion which is situated in the discharge space, and

the carrier (25; 25') is press-fitted onto the end portion of the exhaust tube (26) [which is situated in the discharge space (18)].